

DETAILED DESCRIPTION

In Fig. 2, the normal thermal cycle of the invention consists of a wet compression, indicated with 1-2, regenerative heating indicated with 2-3, continuous combustion heating indicated with 3-4, dry expansions indicated with 4-5, reheating for continuous combustion heating indicated with 5-6, dry expansion indicated with 6-7, regenerative catalytic heating indicated with 7-8, regenerative cooling indicated with 8-9, cooling for condensation of water vapor indicated with 9-10, and with outlet exhaust gases to state 1.

In Fig. 1, indicated with 1 is the dry air filter, indicated with 2, is the oil-free air compressor, this compressor consists essentially of two helical grooved no contact rotors, a male, the driver, four lobes, and one female, six gullies, in a stationary housing with suitable inlet and outlet ports, with water injector and combined sliding valve for capacity modulation from 10 % to 100 % and pressure ratio modulation from 4 to 20, indicated with 3 is the high pressure water separator; in Fig. 1 indicated with 4 the high pressure side of the regenerator, is a heat exchanger that heats the air compressed before combustion with heat rejected by the cycle; indicated with 5, is the first combustor in which the fuel is burned with primary air and the hot gas is diluted with secondary air for a homogeneous mixture of the outlet gas at constant temperature of 2,500 °F, indicated with 6 is the first stage expander, it is a gyratory screws machine without contact between screws or housing and screws, this expander drives only the compressor and the accessories, the hot gas escaping in the first expander is recuperated

by the second expander, the outlet gas from the first expander indicated with 6, that goes to the second combustor indicated with 7 or to the catalyzer indicated with 9, by means of a damper indicated with 19, in principle the part at high temperature use a stainless steel alloy of iron-cobalt-nickel with coating of alloy of chromium-aluminium-ytrio, the internal cooling is by water at head pressure for bearing and gears box, and by water vaporization in rotors and housing; the second combustor indicated with 7 has steam injection generated by the internal cooling, for inlet run the fuel injection is cut, the pressure ratio is reduced at minimum, and the damper indicated with 19 is closed, in normal run the outlet gas of the second combustor indicated with 7 is of constant temperature, 2,500 °F; indicated with 8 is the second stage expander which drives the outpower shaft, the escaping of hot gas in second expander is recupered by the regenerator; indicated with 9 is a typical catalytic converter for regenerative combustion turbine; indicated with 10 is the low pressure side regenerator; indicated with 11 is an air cooled condenser that recuperated water from water injector and generated by combustion, indicated with 12 is the low pressure water separator; indicated with 13 is the water tank insulated with automatic heater for low temperatures, water filter for the solid removal and to neutralize oxides and acid of sulphur; indicated with 14 is the water pump for the compressor indicated with 2; indicated with 15 is the air cooled for the water compressor indicated with 2; indicated with 16 is the water injector with the water outlet from cooling of gears,

seals, anti-friction ball and roller bearings of compressor indicated with 2; indicated with 17 is the water and air outlet from compressor indicated with 2 to separator indicated with 3; indicated with 18 is the water control for cooling of expander indicated with 6 and the expander indicated with 8; indicated with 19 is the damper valve for idle run; indicated with 20 is a steam separator; indicated with 21 is a water ejector for exhaust gas aspiration from the low pressure side of the regenerator indicated with 10.-